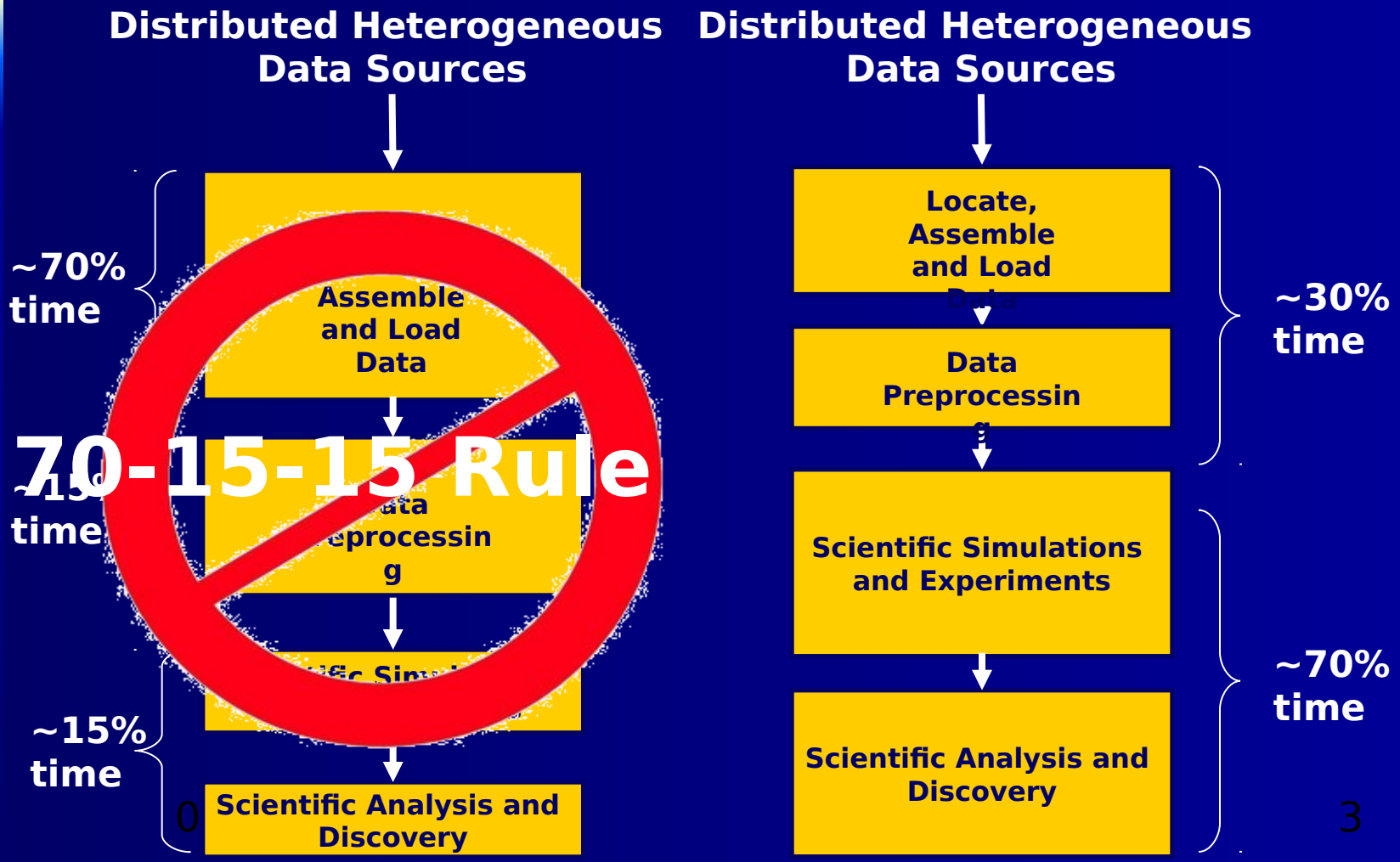
The USACE DataNet

Providing efficient data access through a net-centric framework

Problem

- USACE uses a multitude of heterogeneous computerized systems to assist in decision-making.
- Data is the principle component that drives the decision-making process.
- The efficient handling of data is critical in making timely, cost-effective decisions.
- S&E spend more time acquiring, manipulating, and organizing data than performing analyses to support decisions.

Scientific work flow



Problem (continued)

- Decentralized computing across USACE resulted in vertically focused technology/information.
- How can technology assist in integrating disparate heterogeneous information and making it available to employees, customers, decision makers?

Guiding principles for managing data

- Avoid duplication in data acquisition. Share data wherever possible via networks and partnerships.
- Look for existing datasets before performing data collection.
- Adhere to government and industry data content, access, and delivery standards.
- Manage data to maximize its use by multiple processes.
- Manage data at the owner level and negotiate access arrangements.
- Require the use of metadata for every dataset.

– Natural Resources Information Mgmt Toolkit
Concise Guide for Technical Managers

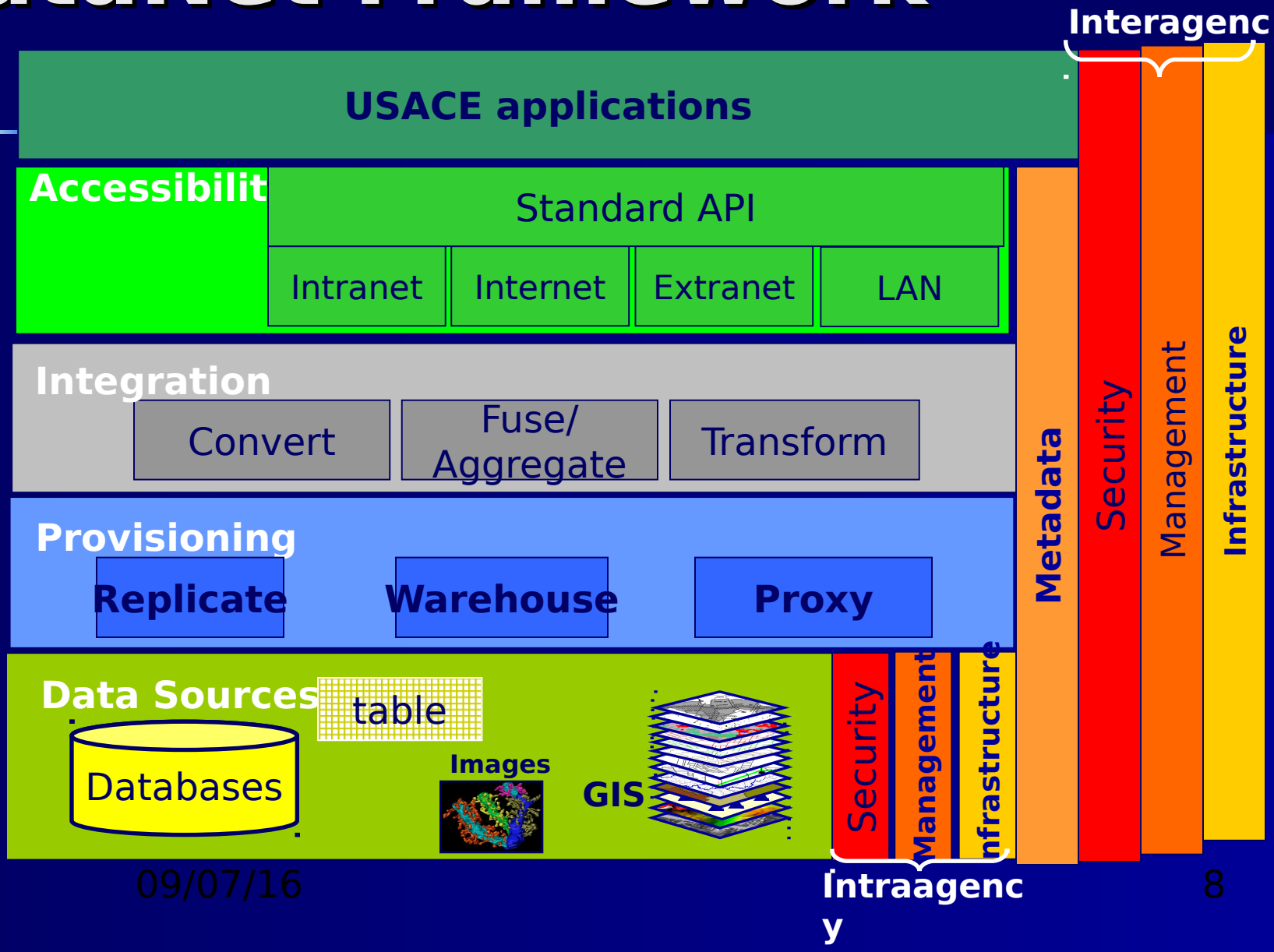
Requirements

- Develop, promote, and deploy a common net-centric framework that provides a consistent interface to data sources internal and external to USACE
- Formalize connectivity to USACE's data sharing partners

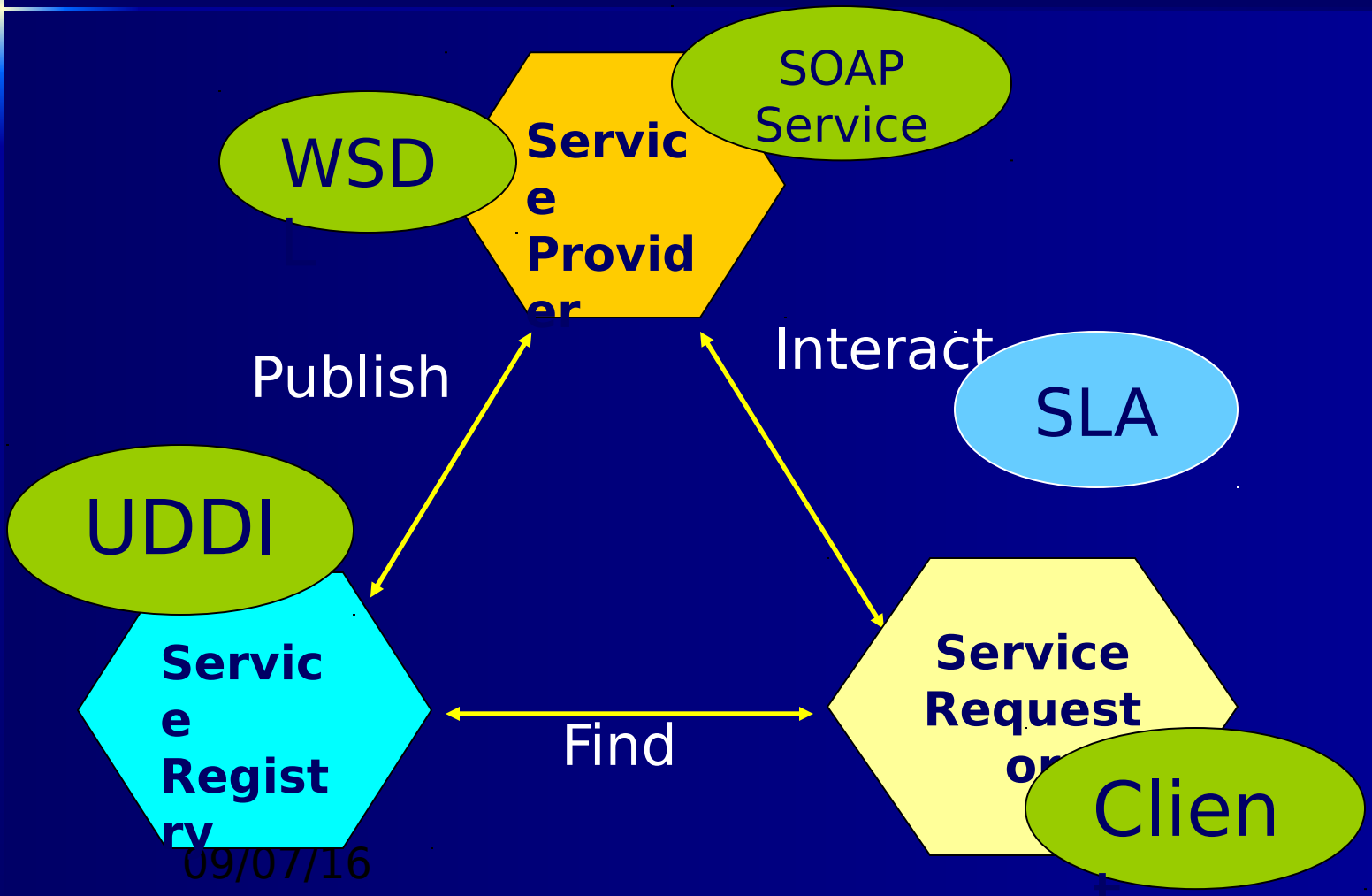
Solution

- The DataNet employs a net-centric approach to streamline and standardize the acquisition, dissemination, and management of data across all USACE business areas.

DataNet Framework



Service-oriented architecture

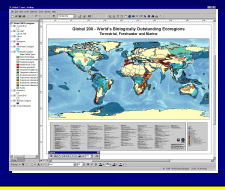


Our Web Service Vision

- Enable the *use of distributed resources*.
  - From this we expect to see fundamental changes in how scientists and engineers access powerful computing systems, multi-scale data archives, scientific instruments, and collaboration tools.
- Provide services that are *integrated with the user's work environment*
  - and that provide uniform and highly capable access to computers, data, and instruments, regardless of the locations or exact nature of these resources

Web-centric Implementation

ArcInfo



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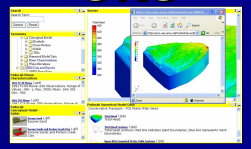

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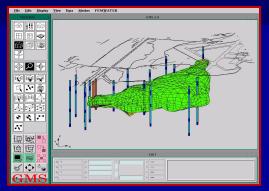
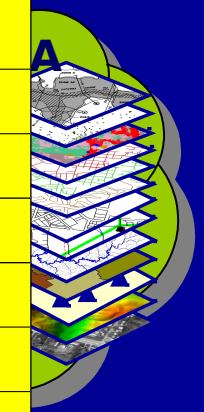


Web services technology offers a platform neu approach for integrating applications four domains

- Interna
- Goverr Goverr
- Goverr Busine
- Goverr Citizen

Category	Data Source
Elevation	USGS NED
	NOAA Estuarine Bathymetry
Weather	Univ. of Utah Meso West Precipitation/Weather
	METAR current surface cond.
	NCDC Precipitation
Hydro	USGS Stream Flow
	CWMS Realtime Gage data
	CWMS dss data
Infrastructure	USACE NID
Soils	USDA STATSGO
LandUse	USGS LULC data



and State Partners

Accessibility

Web Farm

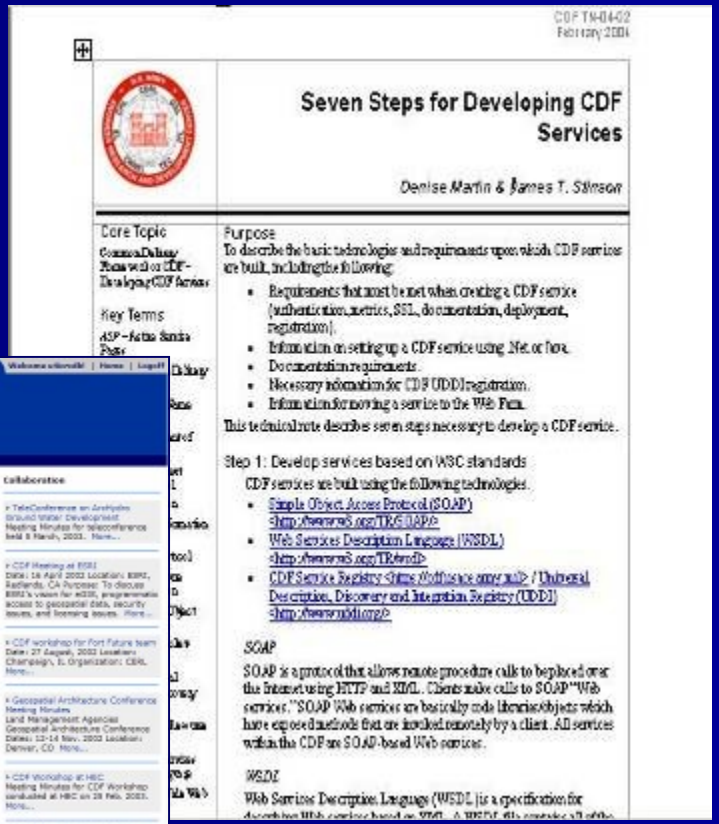
- . Centralized and secure Web development and Web hosting environment that serves as the operational platform for all local DataNet services.

Approach

- Centralizes interactions with DREN and CEEIS
- Provides 24x7x365 operational capabilities – higher availability
- Conducts backups
- Provides connectivity to Internet, Intranet, and Extranet
- Supports both Windows and Unix
- Monitors resource access
- Provides DoD certified computing environment
- Shares cost among all users
- Recycles hardware every 3 years

Metadata

- Technical documentation
- Service Registry



Seven Steps for Developing CDF Services

Denise Martin & James T. Stinson

Core Topic

Key Terms

Purpose

To describe the basic technologies and requirements upon which CDF services are built, including the following:

- Requirements that must be met when creating a CDF service (authentication, metrics, SSL, documentation, deployment, registration).
- Information on setting up a CDF service using .Net or Java.
- Documentation requirements.
- Necessary information for CDF UDDI registration.
- Information for moving a service to the Web Farm.

This technical note describes seven steps necessary to develop a CDF service.

Step 1: Develop services based on WSC standards

CDF services are built using the following technologies:

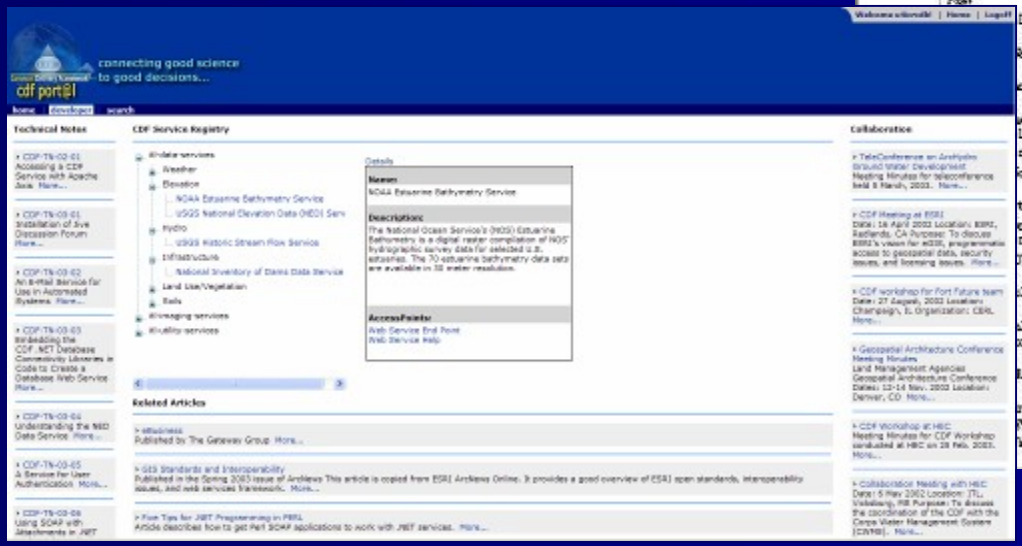
- Simple Object Access Protocol (SOAP)
- Web Services Description Language (WSDL)
- CDF Service Registry / Universal Description, Discovery and Integration Registry (UDDI)

SOAP

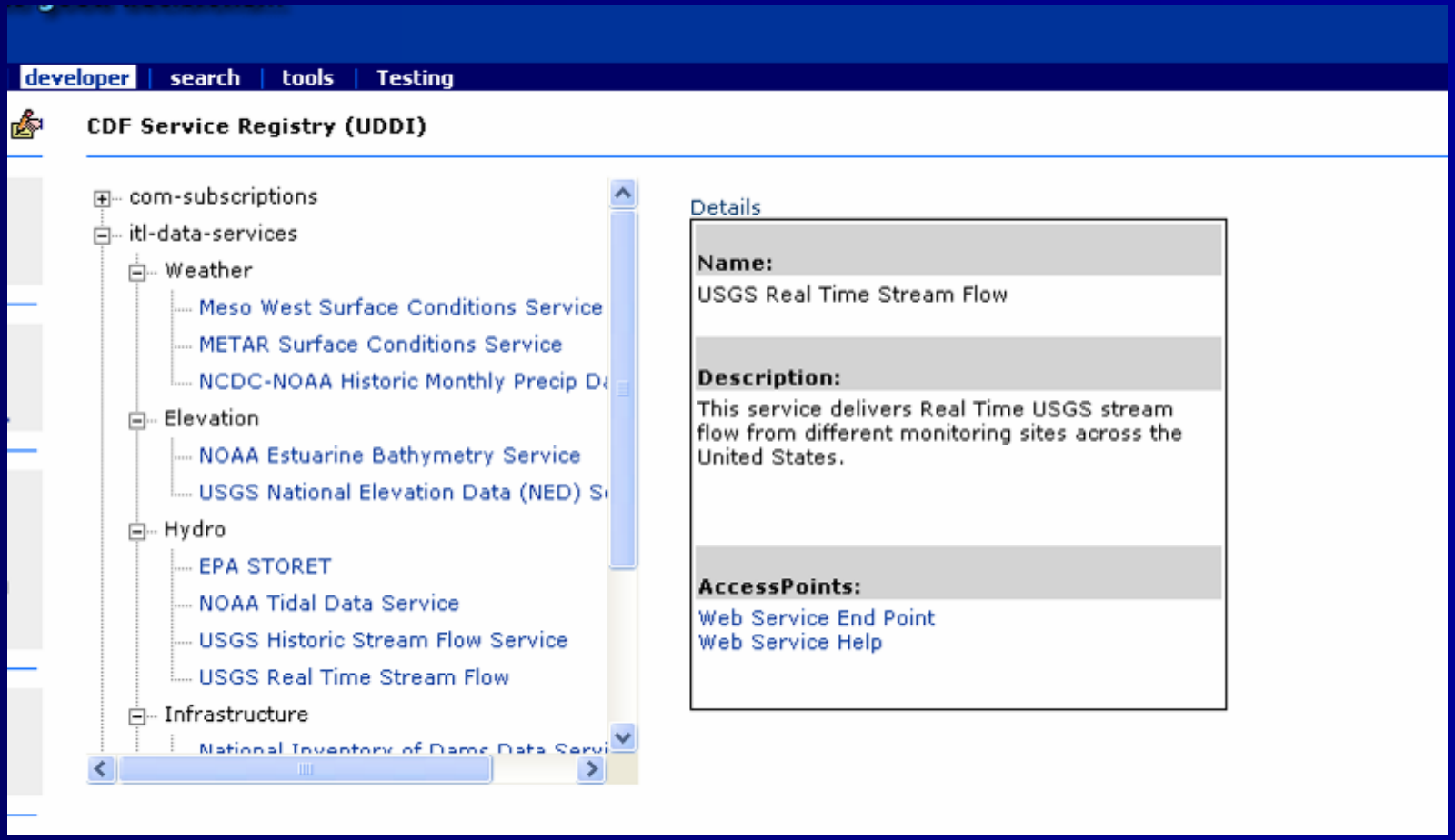
SOAP is a protocol that allows remote procedure calls to be replaced over the Internet using HTTP and XML. Clients make calls to SOAP "Web services." SOAP Web services are basically code libraries/objects which have exposed methods that are invoked remotely by a client. All services within the CDF are SOAP-based Web services.

WSDL

Web Services Description Language (WSDL) is a specification for



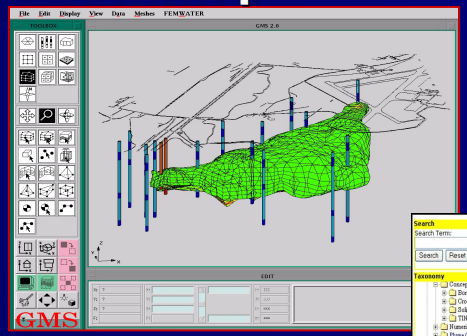
CDF Service Registry



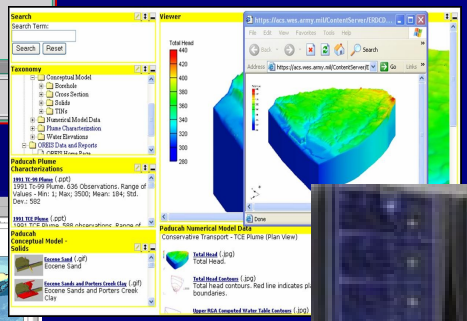
DataNet Framework - Applications

A common approach to accessing and sharing data – "One Data World"

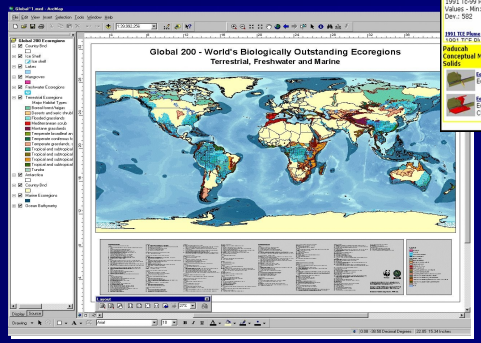
desktop



Web-based



COTS



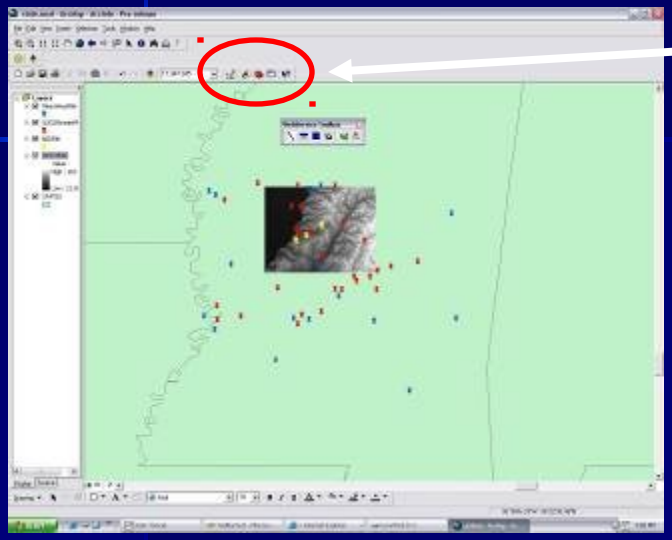
HPC Systems

The challenge is to develop a framework that will support data accessibility by all of these applications.

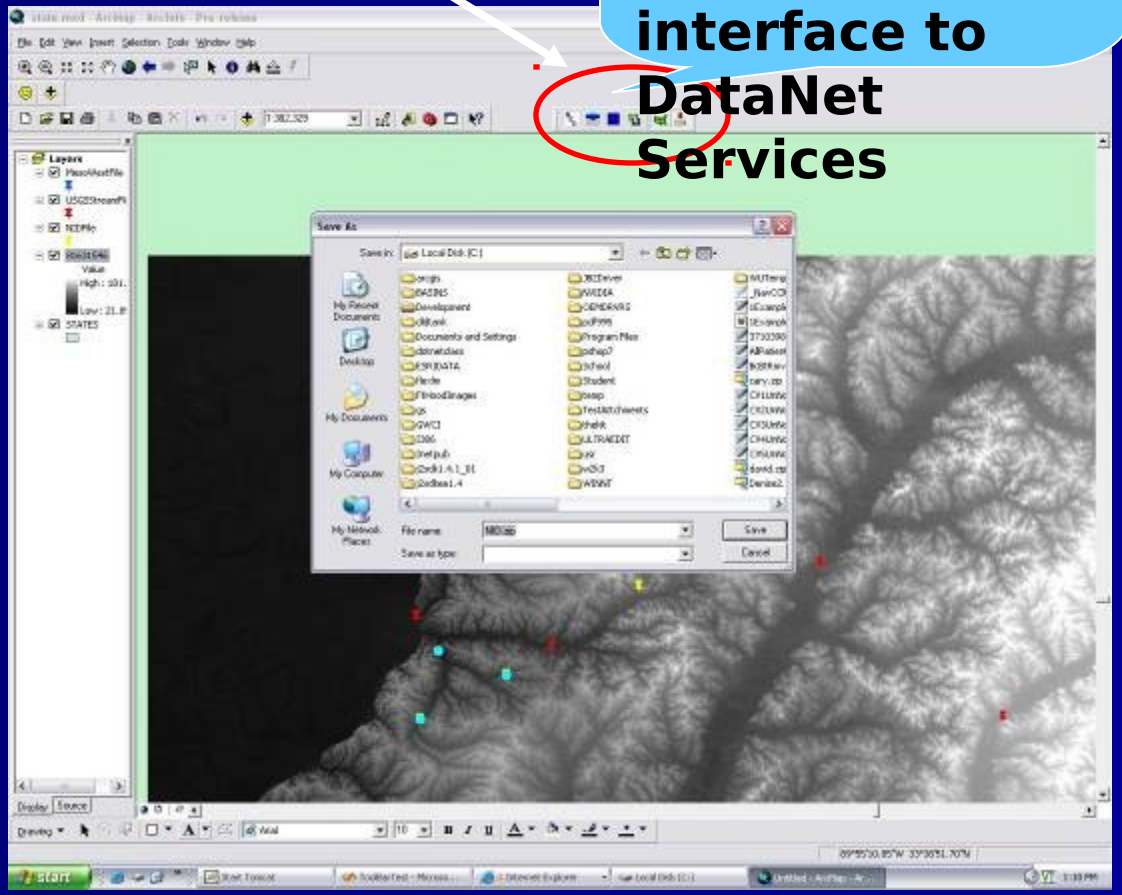
Locating and assembling data

SEDB is a common gateway interface that serves data from a variety of information sources and scientific formats. SEDB accesses these sources via the DataNet.

CDF Connection to ArcGIS

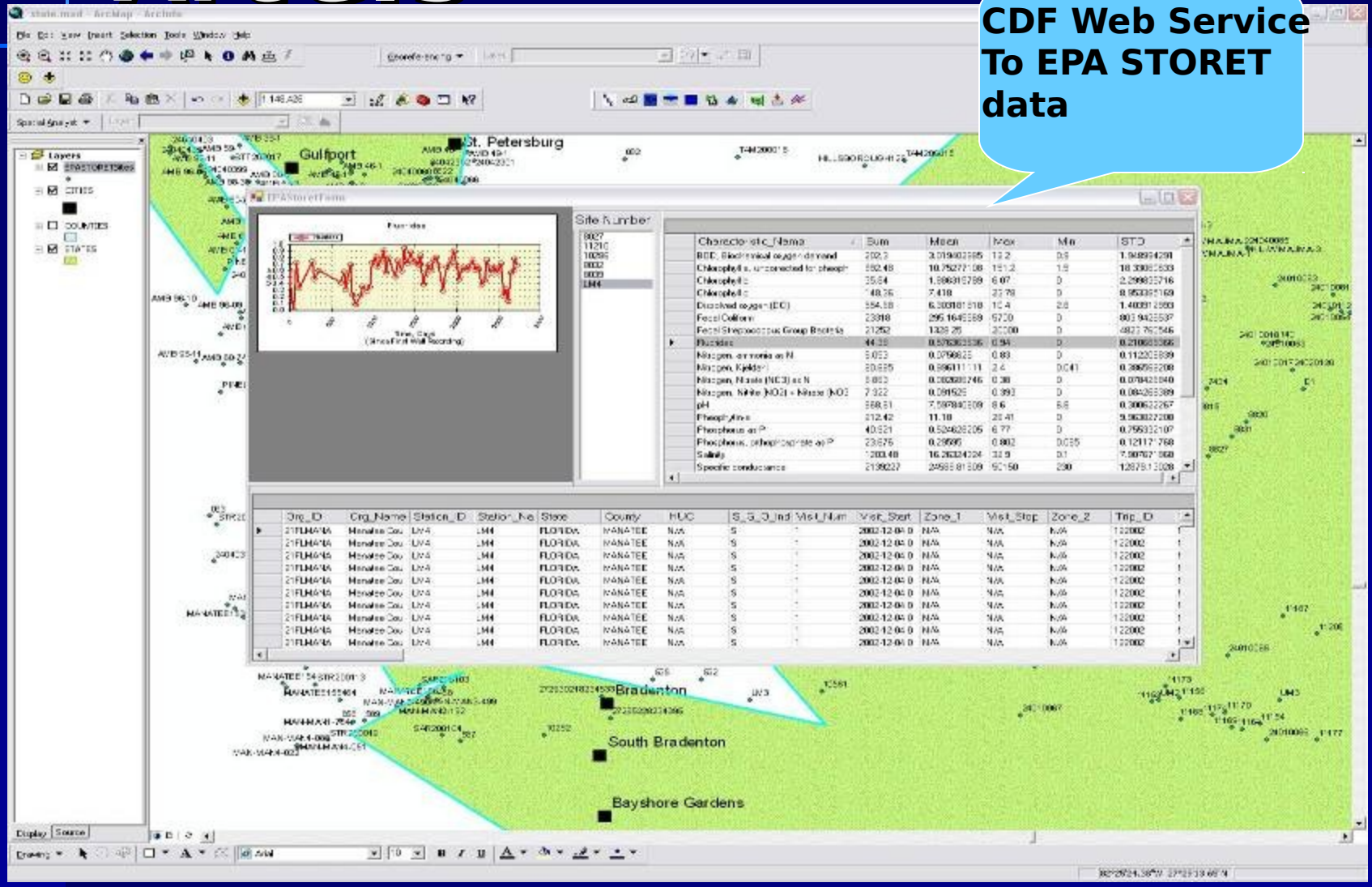


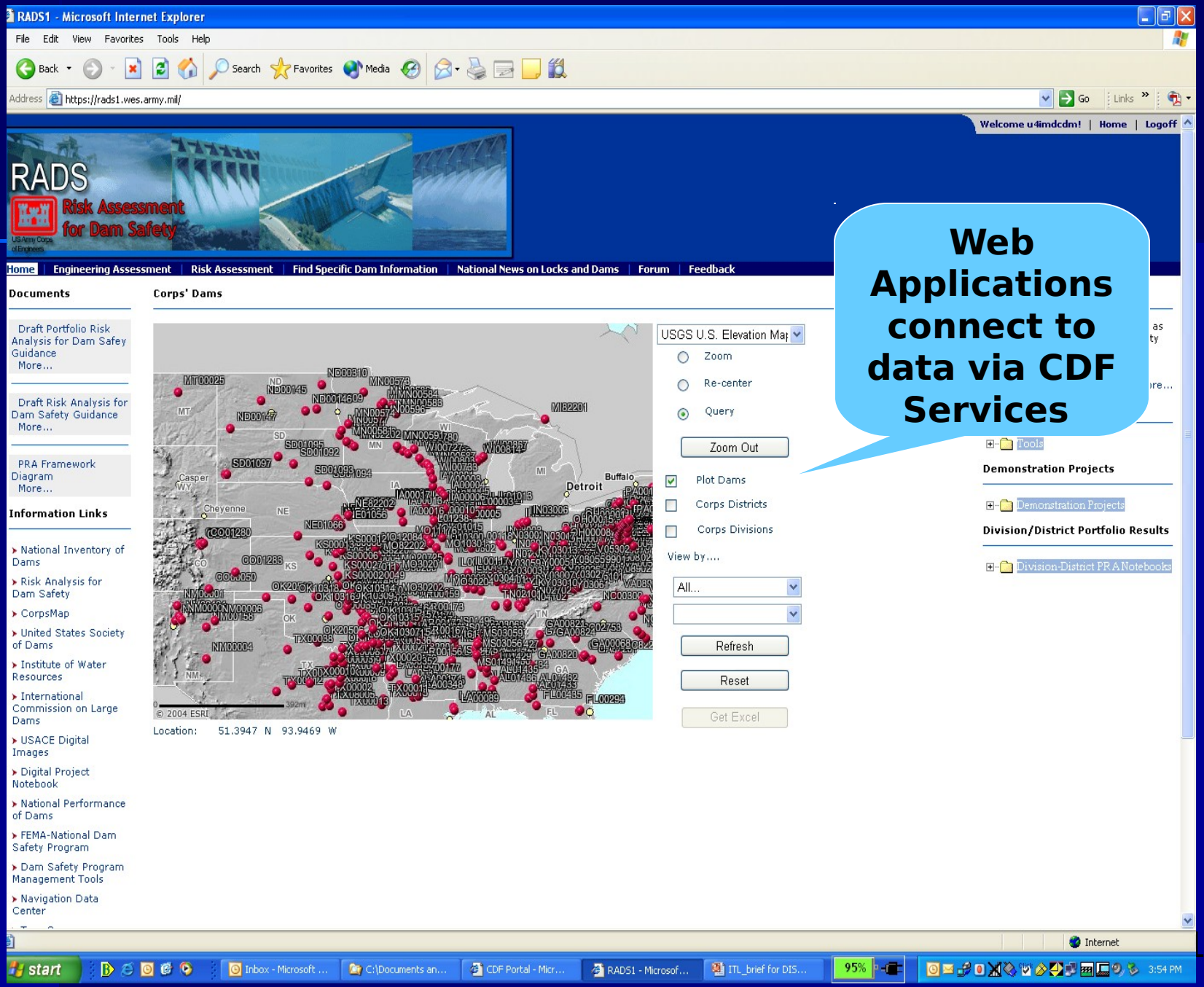
S&E Toolbar provides simple interface to DataNet Services



ArcGIS Application

CDF Connection to ArcGIS

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PRA Framework Diagram More...
Information Links
National Inventory of Dams
Risk Analysis for Dam Safety
CorpsMap
United States Society of Dams
Institute of Water Resources
International Commission on Large Dams
USACE Digital Images
Digital Project Notebook
National Performance of Dams
FEMA-National Dam Safety Program
Dam Safety Program Management Tools
Navigation Data Center
Corps' Dams
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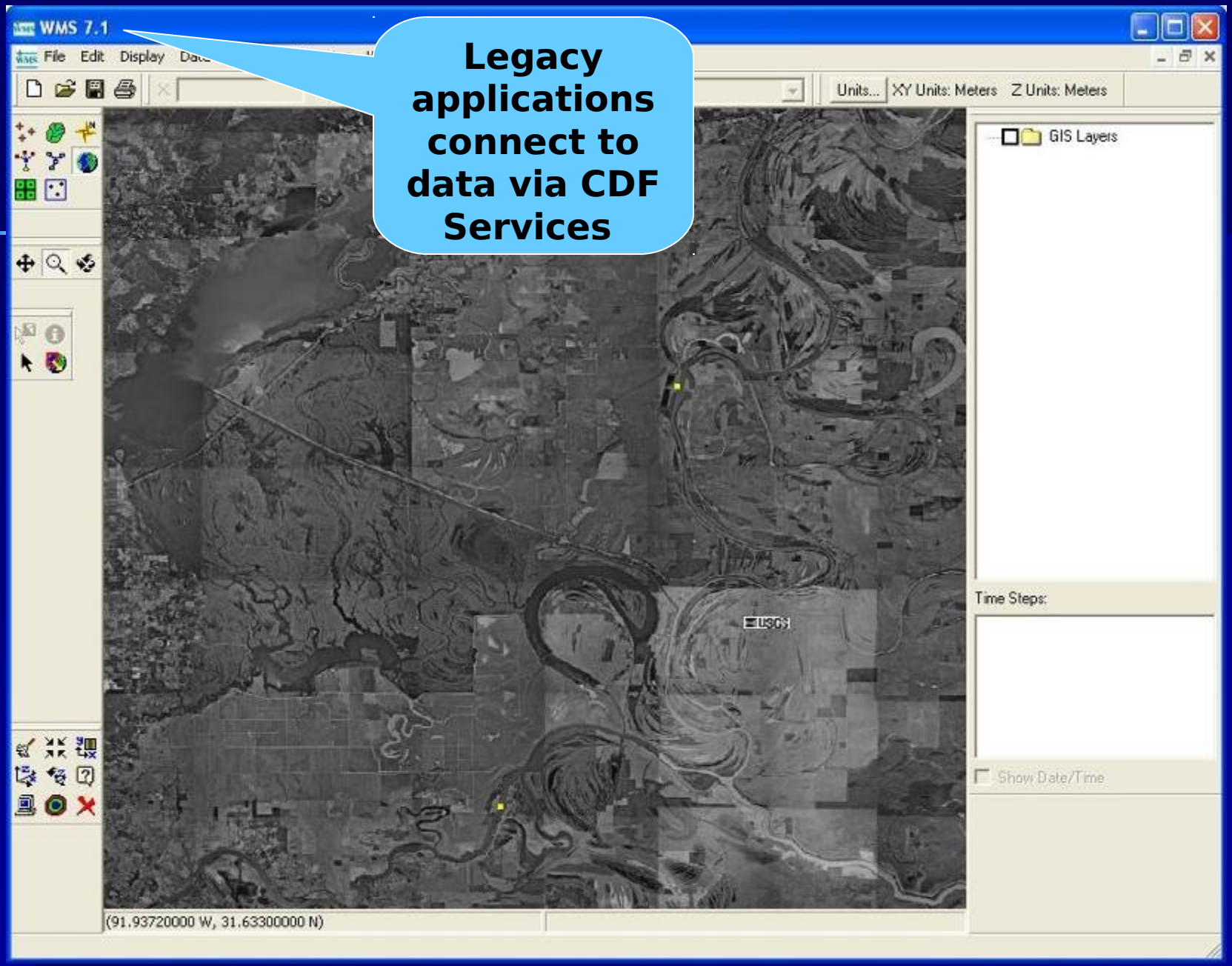
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Legacy applications connect to data via CDF Services

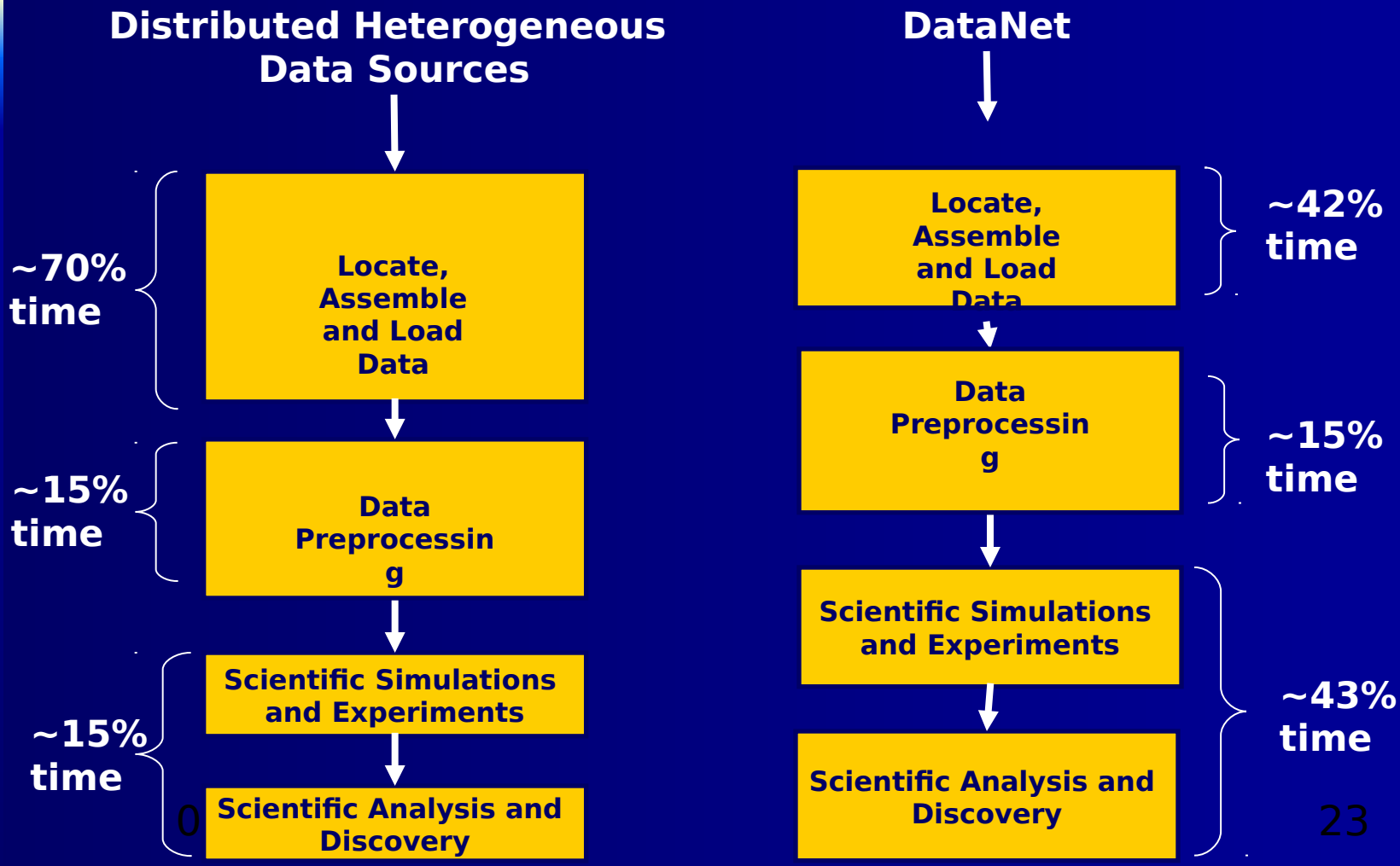
Summary

- **The DataNet framework:**
  - **avoids duplication in data acquisition**
  - **facilitates the sharing of data, both internal and external, via networks and partnerships**
  - **adheres to standards**
  - **promotes owner-level management and service-level agreements**
  - **requires metadata for data and services**
  - **is accessible by distributed, heterogeneous applications**
- **Consistent with the basic guiding principles of data management**

Summary

- The DataNet provides a one-stop-shop for data acquisition from within USACE, from other federal and state agencies, and from industry.
- S&E applications can access heterogeneous data sources via the DataNet in a timely and secure manner.
- The DataNet framework truly provides a standards-based realization of the service-oriented computing paradigm.

Scientific work flow improvement



Questions

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